



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

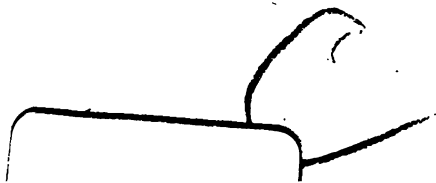
About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>



15192
f. 201

15192 f. 201



1

2

3

4





Order of St. John of Jerusalem in England.

Lord Prior.

HIS GRACE WILLIAM DROGO, DUKE OF MANCHESTER, K.P.

Bailiff of Eagle.

The Right Honble. WILLIAM HENRY, BARON LEIGH.

Commander of Hanley Castle.

SIR EDMUND A. H. LECHMERE, Bart., M.P., F.S.A.

The Council.

President—General SIR JOHN ST. GEORGE, K.O.B.

Major-General the Most Honble. the Marquis CONYNGHAM.

The Right Honble. the Earl of DUDLEY.

The Right Rev. the Lord Bishop of ST. ALBANS (*Chaplain-General*).

SIR EDWARD G. L. PERROTT, Bart.

Lieut.-General SIR H. C. B. DAUBENEY, K.O.B.

JOHN FURLEY, Esq.

Colonel JAMES BOURNE, M.P.

Executive Officers.

(*Who are ex-officio Members of the Council.*;

Chancellor—General SIR JOHN ST. GEORGE, K.O.B.

Secretary and Receiver—SIR E. A. H. LECHMERE, Bart., M.P., F.S.A.

Almoner—General the Viscount TEMPLETOWN, K.O.B.

Registrar—Lieut.-Colonel GOULD WESTON, F.S.A.

Genealogist—Rev. W. K. R. BEDFORD, M.A.

Librarian—EDWIN FRESHFIELD, Esq., M.A., F.S.A.

Assistant Secretary—Captain PERROTT.

Ambulance Department—Director: Major FRANCIS DUNCAN, R.A., M.A., D.C.L., LL.D.

Bankers—THE LONDON AND WESTMINSTER BANK.
1, St. James's Square, S.W.

Communications may be addressed to the Secretary of the Order of
St. John, St. John's Gate, Clerkenwell, London, E.C.

NINETEENTH THOUSAND.

Order of St. John of Jerusalem in England,
AMBULANCE DEPARTMENT.

HANDBOOK

DESCRIBING

AIDS FOR CASES OF INJURIES
OR SUDDEN ILLNESS.

BY

PETER SHEPHERD, M.B.,

SURGEON-MAJOR, ARMY MEDICAL DEPARTMENT;
ASSOCIATE OF THE ORDER OF ST. JOHN OF JERUSALEM.

PRO UTILITATE HOMINUM.

1878.

PRICE ONE SHILLING.

[Copyright registered at Stationers' Hall.]

LONDON :
PRINTED BY THE ARMY AND NAVY CO-OPERATIVE SOCIETY, LIMITED,
117, VICTORIA STREET, WESTMINSTER, S.W.



CONTENTS.



PART I.

ANATOMICAL AND PHYSIOLOGICAL OUTLINES.

	PAGE
Section I. The Skeleton	4
II. The Muscular System	8
III. The Nervous System	9
IV. The Organs of Special Sense	11
V. The Blood and Organs of Circulation	13
VI. The Organs of Voice and Respiration	22
VII. The Organs of Digestion	25
VIII. The Organs of Secretion	26
IX. The Organs of Excretion	28

PART II.

MEDICAL AND SURGICAL OUTLINES.

CHAPTER I.		PAGE
INSSENSIBILITY:		
Causes of ... ..	...	29
Method of Examination of Persons found Insensible ...	...	30
Important Symptoms and their Indications ...	...	31

CHAPTER II.

IMPORTANT DISEASES AND INJURIES OF THE HEAD:		
Intoxication ... ..	...	33
Apoplexy ... ..	...	33
Epilepsy ... ..	...	33
Blood Poisoning ... ..	...	34
Opium Poisoning ... ..	...	34
Shock or Collapse ... ..	...	34
Concussion of Brain ... ..	...	35
Compression of Brain ... ..	...	35

CHAPTER III.

TREATMENT OF CASES OF		
Drowning ... ..	...	35
Hanging ... ..	...	38
Suffocation by Gases ... ..	...	38
Sunstroke ... ..	...	38

CHAPTER IV.

HÆMORRHAGE OR BLEEDING:		PAGE
General treatment of	...	39
ARTERIAL:		
" Treatment of	...	39
VENOUS:		
" Treatment of	...	40
CAPILLARY:		
" Treatment of	...	40
INTERNAL:		
" Treatment of	...	40
SITUATION OF THE MAIN ARTERIES OF THE BODY, AND		
THEIR TREATMENT WHEN WOUNDED:—		
Hæmorrhage from head and face and neck	...	41
" " armpit	...	41
" " upper arm	...	41
" " fore-arm	...	42
" " palm	...	42
" " thigh	...	42
" " ham	...	42
" " back of leg	...	43
" " front of leg and instep	...	43
" " sole of foot	...	43

CHAPTER V.

FRACTURES:

Varieties of	...	44
Signs of	...	44
General treatment of	...	44

FRACTURES—continued.**PAGE**

Fractures of Skull	...	...	...	...	...	45
Lower Jaw	...	...	...	...	...	45
Collar-bone	...	...	...	...	...	46
Ribs	...	...	...	...	...	46
Upper Arm	...	...	...	...	...	46
Fore-arm	...	...	...	...	...	47
Wrist and Hand	...	...	...	...	...	47
Thigh	...	...	...	...	...	47
Knee-cap	...	...	...	...	...	48
Bones of Leg	...	...	...	...	...	48
Foot and Ankle	...	...	...	...	...	48

CHAPTER VI.**WOUNDS:**

Incised: Treatment of	49
-----------------------	-----	-----	-----	-----	-----	----

With Protruding Internal Organs: Treatment of	49
---	-----	-----	-----	-----	-----	----

Contused and Lacerated: Treatment of	49
--------------------------------------	-----	-----	-----	-----	-----	----

FOREIGN BODIES IN THE EYE	50
---------------------------	-----	-----	-----	-----	-----	----

" " " EAR	50
-----------	-----	-----	-----	-----	-----	----

BURNS AND SCALDS	51
------------------	-----	-----	-----	-----	-----	----

Treatment of	51
--------------	-----	-----	-----	-----	-----	----

FROST BITE	51
------------	-----	-----	-----	-----	-----	----

Treatment of	51
--------------	-----	-----	-----	-----	-----	----

BED SORES:	52
------------	-----	-----	-----	-----	-----	----

Treatment of	52
--------------	-----	-----	-----	-----	-----	----

BITES FROM RABID ANIMALS:

Treatment of	52
--------------	-----	-----	-----	-----	-----	----

CHAPTER VII.

MATERIAL AND APPLIANCES FOR THE RELIEF OF THE SICK
AND INJURED.

	PAGE
THE ORDER OF ST. JOHN LITTER	52
STRETCHERS, AND HOW TO USE THEM... ..	53
Rules for carrying	53
SPLINTS	54
PADS	54
BANDAGES	54
DRESSINGS	55
STIMULANTS	56
POULTICES	56
LEECHES	56

CHAPTER VIII.

DISINFECTION:

Definition of	57
Disinfectants	57
Rules for Disinfecting Unoccupied and Occupied Rooms	58
Rules for Preventing Spread of Infectious Diseases ...	60

CHAPTER IX.

BATHS:

Cold	61
Cool	62
Temperate	62
Hot	62
Medicated	62
Disinfectant	62
Alkaline	62

X

CHAPTER X.

POISONS:

	PAGE
Definition of	63
Classes of	63
General treatment of	63
Emetics	64
Substitute for Stomach Pump	64
Arsenic	65
Antimony	65
Acids	65
Alkalies	65
Phosphorus	65
Mercury	65
Nitrate of Silver	65
Gases	66
Narcotics	66
Alcohol	66

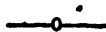
CHAPTER XI.

DEATH:

Cases of Sudden	66
Causes of	67
Appearances of	67

INDEX	69
--------------	----

PREFACE.



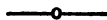
THIS brief Manual is simply intended for non-professional readers. There is no attempt made to popularise Medicine or Surgery; the object is to furnish a few plain rules which may enable any one to act in cases of injury or sudden illness, pending the arrival of professional help.

LONDON,

30th October, 1878.



INTRODUCTION.



At the request of the Members of the Central Ambulance Committee of the Order of St. John of Jerusalem, I have hurriedly arranged the following Manual for the use of the Metropolitan Police and the other Ambulance Classes now organised by the Order of St. John in all parts of England.

The careful work which I should like to have bestowed has been rendered impossible by the exigencies of the Service requiring me to proceed on foreign service.

I have been aided by kind and able coadjutors, who have given their knowledge and experience.

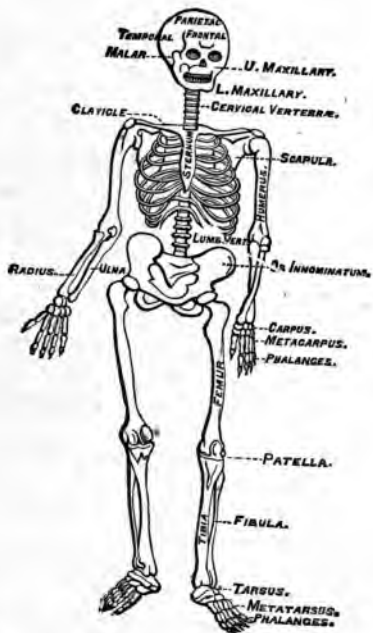
I trust that this handbook, given cheerfully and gratuitously—like all the work conducted for and by the Order—will be found to be in some degree
“PRO UTILITATE HOMINUM.”

P. SHEPHERD.

JUNIOR UNITED SERVICE CLUB,
LONDON, S.W.

30th October, 1878.





PART I.

Anatomical and Physiological Outlines.

THE HUMAN BODY.

I. SKELETON, or bony framework.

II. MUSCULAR SYSTEM; the organs of motion.

III. NERVOUS SYSTEM; brain, spinal marrow, nerves of sensation and motion, and sympathetic nerves.

IV. ORGANS OF SPECIAL SENSE; eye, ear, tongue, nose, and skin.

V. BLOOD AND ORGANS OF CIRCULATION; heart and blood-vessels.

VI. ORGANS OF VOICE AND RESPIRATION; larynx, lungs, and windpipe.

VII. ORGANS OF DIGESTION; pharynx, gullet, stomach, and intestines.

VIII. ORGANS OF SECRETION; salivary glands, liver, and pancreas.

IX. ORGANS OF EXCRETION; kidneys and skin.

I.—THE SKELETON.

The skeleton is divided into three parts ; head, trunk, and limbs.

SKELETON	{ a. head	{skull-cap. face.
	{ b. trunk	{back-bone and breast-bone. ribs.
	{ c. limbs	{shoulders and arms. haunches and legs.

The HEAD contains the brain, and the organs of sight, hearing, taste, and smell.

The CHEST contains the organs of circulation and respiration.

The BELLY contains the digestive apparatus, organs of secretion and excretion, &c.

The UPPER LIMB consists of shoulder, arm, fore-arm, wrist and hand, and is the organ of prehension.

The LOWER LIMB consists of haunch, thigh, leg, ankle, and foot, and is the organ of support and progression.

The SKULL is composed of eight, and the FACE of fourteen, bones.

SKULL	{	1 Frontal (<i>forehead</i>).
	{	1 Occipital (<i>back of head</i>).
	{	2 Temporal (<i>temple bones</i>).
	{	2 Parietal (<i>roof</i>).
	{	1 Ethmoid (<i>sieve</i>), floor.
	{	1 Sphenoid (<i>wedge</i>), floor.

FACE	{	2 Upper Maxillary (<i>jaw</i>).
		1 Lower Maxillary (<i>jaw</i>).
		2 Malar (<i>cheek</i>).
		2 Palate (<i>roof of mouth</i>).
		2 Lachrymal (<i>tear-bones</i>).
		2 Nasal (<i>nose</i>).
		1 Vomer (<i>ploughshare</i>).
		2 Turbinated.

The FACIAL bones, except the lower jaw, are firmly joined together, and form cavities for the reception of the organs of sight, taste, and smell.

The TRUNK is divided into—

- a. Thorax or chest.
- b. Abdomen or belly.
- c. Pelvis.

The THORAX is a bony cartilaginous cage of a conical shape; it contains the organs of circulation and respiration,—heart and lungs, and many great blood-vessels and nerves.

The bones of the thorax are—

- a Spine (*behind*).
- b. Sternum or breast-bone (*in front*).
- c. Ribs and their cartilages (*at sides*).

The SPINE is a hollow flexuous column, and is divided as follows :—

SPINE	{	Cervical or neck portion, 7 bones.
		Dorsal or back portion, 12 bones.
		Lumbar or loin portion, 5 bones.
		Sacrum, rump-bone, 5 bones fused into one.
		Coccyx.

The STERNUM, or breast-bone, forms the front of the chest; it has attached to either side a collar-bone and the cartilages of the seven upper ribs.

The RIBS are twelve pairs of bony arches forming the walls of the chest. They are all attached behind to the spine. The upper seven are termed *true* ribs, being fixed to the breast-bone by their cartilages: the lower five are termed *floating* or *false* ribs, having no attachment in front.

The ABDOMEN is supported behind by the lumbar spine, and below by the bones of the pelvis. Its contents are as follows:—

Liver.

Stomach and intestines.

Pancreas or sweetbread.

Spleen.

Kidneys.

Many large blood-vessels and nerves.

The PELVIS is the basin-shaped cavity which forms the lowest portion of the trunk; and contains the bladder, the internal organs of generation, part of the intestine, and several great blood-vessels and nerves. The pelvis is composed of four bones—

2 Innominate or haunch-bones.

1 Sacrum or rump-bone.

1 Coccyx.

The INNOMINATE or haunch-bones, with the lower portion of spine (sacrum and coccyx), form the lowest portion of the trunk. The innominate bones on their outer surfaces have cup-like depressions for the reception of the heads of the thigh-bones.

The **SHOULDER** is formed by the *clavicle* or *collar-bone* and *scapula* or *blade-bone*.

The **CLAVICLE**, or collar-bone, has a double curve it marks the line dividing neck and chest.

The **SCAPULA**, or blade-bone, lies on the back of the chest, is of a triangular shape, and forms the socket for the humerus or arm-bone.

UPPER LIMB { 1 Humerus, arm-bone.
2 Radius and Ulna, fore-arm.
8 Carpus, wrist.
5 Metacarpus, palm.
14 Phalanges, finger-bones.

The **HUMERUS**, or bone of upper arm, extends from the shoulder to the elbow; above, it is jointed to the scapula, and below to the bones of the fore-arm.

The **ULNA** is the larger bone of the fore-arm, lies on the inside, and extends from elbow to wrist.

The **RADIUS** lies on the outside of the fore-arm.

The **CARPUS** is a double row of small bones which help to form the wrist-joint.

The **METACARPUS** consists of five bones, and form the body of the hand.

The **PHALANGES** are the fourteen finger-bones.

The **LOWER LIMB** is composed as follows:—

LOWER LIMB { 1 Femur—thigh-bone.
1 Patella—knee-cap.
2 Tibia and Fibula—leg-bones.
7 Tarsus—ankle-bones.
5 Metatarsus—instep-bones.
14 Phalanges—toe-bones.

The **HIP JOINT** is a ball-and-socket joint, and is somewhat similar to the joint at the shoulder.

The **FEMUR**, or thigh-bone, extends from hip to knee joint, both of which joints it helps to form.

The **PATELLA** (*knee-cap*) is the small oval bone which forms the prominent point of knee.

The **KNEE JOINT** is formed by the lower end of femur, the patella, and the upper end of the tibia.

The **TIBIA** is the main bone of the leg, and extends from knee to ankle, on the inside of the limb.

The **FIBULA** is the small bone on the outside of the limb: the lower ends of the tibia and fibula form prominent projections at the sides of the ankle.

The **TARSUS**, ankle-bones, are seven irregularly shaped bones, firmly united together; above they are attached to the tibia and fibula, and in front to the metatarsus.

The **METATARSUS** forms the instep, and together with the tarsus the arch of the foot.

The **PHALANGES**, bones of the toes, are fourteen in number, two for the great toe, and three for each of the others.

II.—THE MUSCULAR SYSTEM.

The **MUSCLES** are the active organs of locomotion; they are formed of bundles of reddish fibres; they are the lean flesh. Their fibres can be well seen in a piece of overdone meat.

Muscular tissue is divided into two varieties: striated and non-striated, or voluntary and involuntary; the former is under the control of the will; the latter acts independently.

The **VOLUNTARY MUSCLES** form a fleshy covering to the skeleton. Each muscle consists of bundles of fibres enclosed in a covering, or sheath, and two extremities or tendons for its attachment to the bones.

All muscles have the power of contraction under stimulation, and it is by this property that motion is given to the various levers of the body.

The **INVOLUNTARY**, or non-striated muscles, are found in such organs as the stomach and intestines, and do not act in obedience to the will, but obey the sympathetic nervous system.

III.—THE NERVOUS SYSTEM.

The nervous system is composed as follows :—

- | | |
|-------------------------|---|
| (a) CEREBRO-SPINAL AXIS | { 1. Brain and 9 pairs
of nerves.
2. Spinal cord & 31
pairs of nerves. |
| (b) SYMPATHETIC SYSTEM | |
| | { 3. Ganglia and
nerves. |

The **BRAIN** is the largest and most important mass of nervous matter ; it is subdivided into—

1. Cerebrum.
2. Cerebellum.
3. Medulla oblongata.

The **CEREBRUM**, or brain proper, consists of two similar ovoid masses, divided above by a deep groove, and connected below by a transverse commissure.

It is the seat of the intellect, the emotions, and the will.

The CEREBELLUM, or little brain, lies at the base of the head ; its function is to regulate the movements of the body.

The MEDULLA OBLONGATA is the upper end of the spinal cord : *it is* in this portion that some crossing of the nervous fibres takes place, whereby the reciprocal communication of nervous influences is changed from one side to the other ; and this fact accounts for a blow, injury, or disease on one side of the head producing paralysis of the opposite side of the body.

The CEREBRAL NERVES consist of nine pairs ; they are motor, sensory, or compound in their function. A motor nerve conveys an impulse from the brain to a muscle or organ. A sensory nerve receives and conveys an impression or sensation to the brain. A compound nerve contains motor and sensory fibres, and is consequently possessed of a double function.

The SPINAL CORD is a cylindrical column of nervous tissue, extending from the base of the skull nearly to the lower end of the vertebral canal ; it is eighteen inches in length. It is both a nervous centre and a conductor of nervous influences ; it gives off thirty-one pairs of nerves from its sides. If the cord is cut at any part of the body below are paralysed.

The SPINAL NERVES are thirty-one in number on each side ; they arise from the spinal cord by two roots, an anterior or motor, and a posterior or sensory. They act as conductors, to and from the spinal cord.

The SYMPATHETIC NERVOUS SYSTEM consists of a double chain of small nervous centres or ganglia *which lie along the sides of the spinal column ;*

branches communicate freely with the cerebro-spinal system. They supply the involuntary muscles, and their function is to control the involuntary muscular tissue; they govern the blood-supply, the nutrition of the body, and the secreting and excreting organs. Paralysis of these nerves produces enlargement of the blood-vessels of the parts to which they are distributed.

IV.—THE ORGANS OF SPECIAL SENSE.

The organs of special sense are—

1. Eye.
2. Ear.
3. Nose.
4. Tongue.
5. Skin.

The SPECIAL SENSES have been termed *The Five Gateways of Knowledge*, from the fact that they receive and transmit to the brain impressions regarding surrounding objects through their nerves.

The EYE is an optical instrument, and consists essentially of three coatings or *tunics*, and three humours or refracting media. These transparent media are so constructed that images of objects are focussed on a delicate sheet of nervous matter at the back of the eye.

The tunics are —

1. Sclerotic, behind ; Cornea, in front.
2. Choroid, behind ; Iris, in front.
3. Retina.

The SCLEROTIC is the outer fibrous white covering; behind, it is perforated by the optic nerve and blood-vessels.

to its sides are fixed the muscular apparatus ; in front it is joined to the cornea.

The CORNEA is the clear portion of the eyeball ; it is attached to the sclerotic in front like the glass of a watch.

The CHOROID lies beneath the sclerotic, forms the middle coat, and is very freely supplied with blood-vessels.

The IRIS is continuous with the choroid. It is a thin coloured curtain surrounding the pupil, the size of which it governs, and thereby regulates the admission of light.

The RETINA is a most delicate semi-transparent sheet of nervous matter, lying in the inside and back of the eye.

The TRANSPARENT MEDIA, by which the rays of light are refracted before they form images on the retina, are—

Aqueous humour.

Crystalline lens.

Vitreous humour.

The CORNEA is also a transparent refracting medium.

The AQUEOUS HUMOUR lies in front, between the lens and the cornea.

The CRYSTALLINE LENS lies behind the pupil ; it is a double convex lens.

The VITREOUS HUMOUR lies behind, in front of retina, and occupies about four-fifths of the eye.

The PUPIL varies in size ; it contracts in a bright light, and dilates in darkness.

The EAR, the organ of hearing, is composed of three portions : an *External*, *Middle*, and *Internal*. The external

ear consists of a funnel, canal or tube, and a drum or membrane at its inner end. The drum divides the outer and middle portions.

The middle portion or tympanum communicates with the mouth. The internal ear is the part where the filaments of the nerves are spread out to receive the vibrations or sounds.

Blows on the external ear, and concussions from gunshot and other explosions, are apt to rupture the tympanum or drum.

The NOSE, or organ of smell, is a double-chambered cavity, lined with a mucous membrane, over which is spread numerous nerve filaments, branches of the olfactory nerves, for the reception of odoriferous impressions.

The TONGUE, or organ of taste, is situated in the floor of the mouth. It is mainly composed of muscular tissue, and is freely supplied with blood-vessels and nerves. Its upper surface is studded with papillæ. The nerve filaments are spread out over the surface of the tongue and back portions of the mouth.

The SKIN, or organ of touch, is the entire covering of the body; the modified skin (*mucous membranes*) lining passages also possesses this property. The nerve filaments end in small loops inside the papillæ. The sense of touch is most delicate about the tips of the fingers and lips.

V.—THE BLOOD & ORGANS OF CIRCULATION.

The BLOOD, or "*river of life*," is the most important and abundant fluid in the body; it is contained in the *arteries, veins and capillaries*—is everywhere present—provides

the tissues with nourishment, and removes their waste products. The total quantity of blood is estimated at about one-twelfth to one-eighth of the weight of the body. Its colour in the arteries is bright red; in the veins dark purple.

Great loss of blood produces death; so also does any considerable change in its composition.

Blood removed from the body separates into two portions—a red clot and a clear fluid. Its temperature in the body is from 98 deg. to 100 deg. Its composition is as follows:—

BLOOD	{	Water.
		Corpuscles— <i>red and white cells.</i>
		Albumen.
		Fibrine.
		Fatty matter.
	}	Gases.

The organs of circulation are—

(a.) HEART.

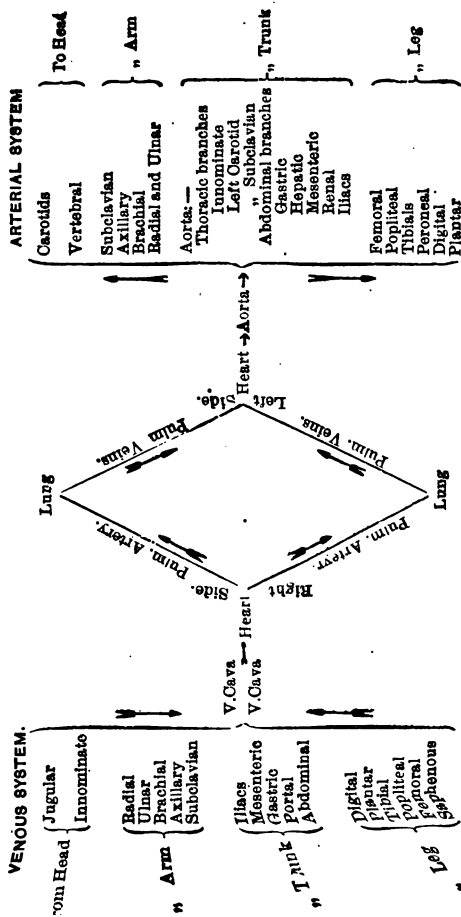
(b.) BLOOD-VESSELS { Arteries.
Capillaries.
Veins.

The HEART is a hollow muscular organ, situated between the two lungs, and enclosed in a sac called the *pericardium*. It is about five inches long, and three and a-half inches broad, and is divided into two halves—a right and a left—each side or half having two chambers, an auricle and a ventricle.

The right side receives the venous blood, and drives it to the lungs to be purified and returned to the left.

The left side receives the arterial blood, and ~~forwards it~~ *forwards it* through the arteries to every region of the body.

TABULAR VIEW OF CIRCULATION.



The openings between the chambers and the mouths of the large vessels leading into or out of the heart are guarded by valves or trap-doors, to prevent regurgitation.

ACTION OF THE HEART.—The heart acts by alternately contracting and dilating, at the rate of seventy to eighty times per minute. The two auricles contract and dilate simultaneously, and so do the ventricles, but the former alternately with the latter.

CIRCULATION.—The impure blood returns from the body through the veins, and enters the right auricle; the right auricle contracts and forces the blood into the right ventricle; the right ventricle then contracts and forces the blood on to the lungs, where it becomes purified. After being purified it returns to the other side of the heart, to the left auricle, which contracts and drives it into the left ventricle; the left ventricle now contracts and drives the blood through the arteries to the system generally, where it is conveyed by the capillaries into the veins. The preceding is a rough tabular view of the course of the blood.

THE ARTERIES.

The arteries are the vessels which convey the blood from the heart to every part of the body. The Pulmonary Artery arises from the right ventricle of the heart, and carries venous blood directly to the lungs, from whence it is returned by the pulmonary veins to the left auricle. This constitutes the lesser or *pulmonic circulation*. The Aorta arises from the left ventricle, and carries through its subdivisions arterial blood to the body generally. This constitutes the *greater or systemic circulation*. The aorta and its branches resemble

highly ramified tree. The larger trunks are usually found in the most protected situations; the arteries terminate in the capillaries; and the veins begin in them.

DIFFERENCES BETWEEN ARTERIES AND VEINS:—

1. The arteries carry blood away from the heart towards the extremities.
2. The veins carry blood towards the heart from the extremities.
3. Arteries carry red blood. Veins carry dark purple blood.
4. The walls of the arteries are stronger and more elastic, and have no valves, except where they leave the heart.
5. The walls of the veins are thin, and have valves on their inner wall, which prevent blood from flowing backwards.
6. Some veins are quite superficial; the arteries lie more deeply.
7. The current is slower in the veins.

PRINCIPAL ARTERIES.

The **AORTA** arises from the left ventricle of the heart; it ascends for a short distance, arches backwards, and descends along the left side of the spine, through the chest and abdomen, until it is opposite the fourth lumbar vertebra, where it divides into the two *iliacs*.

The **INNOMINATE ARTERY**, a short trunk arising from the arch of aorta, extends upwards for about an inch and a-half, and divides into the right carotid and right *subclavian*.

The RIGHT COMMON CAROTID is a branch of the innominate artery ; the LEFT COMMON CAROTID is a branch of the aorta. These two vessels ascend the neck, one on each side of the windpipe, to about an inch below the angle of the jaw, where they divide into the external and internal carotids. The course of each vessel is indicated by a line drawn from the joint of the collar and breast bones (*sterno-clavicular articulation*), to a point midway between the angle of the jaw and a prominence of bone behind the ear (*mastoid process*).

The INTERNAL CAROTID commences at the division of the common carotid, opposite the upper border of the thyroid cartilage, and proceeds upwards to the base of the skull, which it enters and supplies the brain.

The EXTERNAL CAROTID is the outer branch of the common carotid ; it proceeds upwards towards the ear, in front of which it passes on to the temple. It supplies various branches to the face, temple, and back of head.

The SUBCLAVIAN, on the right side, is a branch of the innominate artery ; on the left side it is a branch of the aorta. They leave the cavity of the chest by passing under the collar-bones and over the first ribs, and terminate in the armpit by becoming the axillaries.

The AXILLARY is a continuation of the subclavian ; begins at lower border of first rib ; and, after crossing the armpit, ends in the brachial at the margin of the anterior fold of the arm pit.

The BRACHIAL is a continuation of the axillary ; it lies well on the inside of the upper arm, and extends from the anterior fold of armpit to about an inch below the elbow, *where it divides into the radial and ulnar.*

The course of this vessel is indicated by a line drawn from outer side of axillary space to a point at the middle of the bend of the elbow, or by the inner border of the biceps muscle; failing these guides, by its pulsation.

The **RADIAL** extends downwards along the radial or outer side of the fore-arm, from a little below the bend of the elbow to the wrist; it here winds round to the back of the metacarpal bone of thumb; passes through between the thumb and forefinger to the palm; and forms the deep palmar arch.

The **ULNAR** is the larger of the two divisions of the brachial. It descends along the ulnar or inner side to the wrist; and then, entering the palm, forms the superficial palmar arch.

The **COMMON ILIAC ARTERIES** are formed by the bifurcation of the aorta; they pass downwards and outwards to the brim of the pelvis, where they divide into external and internal iliacs.

The **EXTERNAL ILIAC** commences at the bifurcation of the common iliac, passes along the brim of the pelvis and makes its exit from the abdomen at the middle of the fold of the groin.

The **INTERNAL ILIAC** is the inner division of the common iliac; it descends into the pelvis and supplies the organs there.

The **FEMORAL**, the continuation of the external iliac, descends along the inside of the thigh for two-thirds of its length, and then passes to the back of the thigh to become the popliteal. The course of the artery is indicated by drawing a line from the middle of the fold of the groin to the inside of knee joint.

The **POPLITEAL**, a continuation of the femoral, extends along the back of the lower third of the thigh to a little below the knee joint; it runs down the middle of the ham; and divides into the anterior and posterior tibial.

The **ANTERIOR TIBIAL**, a branch of the popliteal, passes to the front between the two bones of the leg and descends to the instep, where it divides into branches for the toes. A line drawn from head of fibula to a point midway between the two projecting ankle-bones (*malleoli*) will be parallel to this artery.

The **POSTERIOR TIBIAL** is the other branch of the popliteal; it runs down the back of the leg, and, passing along the depression behind the inner ankle-bone, supplies branches to the sole of the foot.

The **PERONEAL** arises from the posterior tibial, passes down on the outside of the back of the leg, and divides into branches around the heel and outer ankle.

THE VEINS.

The veins are the vessels which serve to return the blood from the capillaries throughout the different parts of the body to the heart.

The **PULMONARY VEINS** are four in number; two for each lung. They carry arterial blood from the lungs to the heart.

The **SYSTEMIC VEINS** return the dark impure venous blood from the body generally to the right side of the heart.

Most veins are provided with valves to prevent the reflux of blood.

Veins are divided into superficial and deep; the former can be readily seen under the skin, the latter lie deeply and accompany arteries. The current in the veins flows towards the heart, exactly the reverse of what obtains in the arteries.

The veins starting in the capillaries unite again and again till they form two large trunks, which empty themselves in the right auricle.

VEINS OF HEAD AND NECK.—The jugulars, formed by numerous branches from the head, face, and neck, pass down from about the angle of the jaw to the inside of the chest, and, uniting with the subclavian, form the innominate vein.

VEINS OF UPPER EXTREMITY are divided into a *superficial* and a *deep* set.

The deep set correspond to and lie alongside the arteries. The superficial set are the radial, ulnar, median, basilic, and cephalic. The brachial receives the cephalic and forms the axillary. The axillary crosses the armpit, and becomes the subclavian at the lower border of first rib.

The **SUBCLAVIAN** vein is a continuation of the axillary, lies behind the collar-bone, crosses from outer edge of first rib to behind sterno-clavicular joint, and joins the internal jugular, to form the innominate.

The **INNOMINATE VEINS** are two large trunks placed one on each side of the root of the neck; they unite together and form the *upper vena cava*.

The **SUPERIOR VENA CAVA**, formed by the main vessels from the upper half of the body, empties itself in the *right auricle*.

--

VEINS OF THE LOWER EXTREMITY are divided into two sets, *superficial* and *deep*.

The *superficial* are the internal and external saphenous. The former begins about the instep and ascends on the inner aspect of leg and thigh, is joined by numerous branches on its way, and joins the femoral just below the fold of the groin; the latter ascends the back of leg to join the popliteal in the ham. The popliteal passes up through the ham, and then through the substance of the thigh to become the femoral. The femoral lies alongside the artery in front of the thigh in its upper two-thirds.

The **EXTERNAL ILIAC** is the continuation of the femoral, and terminates by uniting with the internal iliac to form the common iliac.

The **INTERNAL ILIAC** collects the blood from the organs in the pelvis.

The **COMMON ILIACS**, formed by the junction of the external and internal iliacs, terminate by uniting to form the inferior vena cava.

The **INFERIOR VENA CAVA** returns the blood to the right side of the heart (*right auricle*) from all parts below the midriff. It is formed by the union of the two common iliacs, and joined by branches from the liver, kidneys, and other viscera.

VI.—THE ORGANS OF VOICE & RESPIRATION

The organs of voice and respiration are—

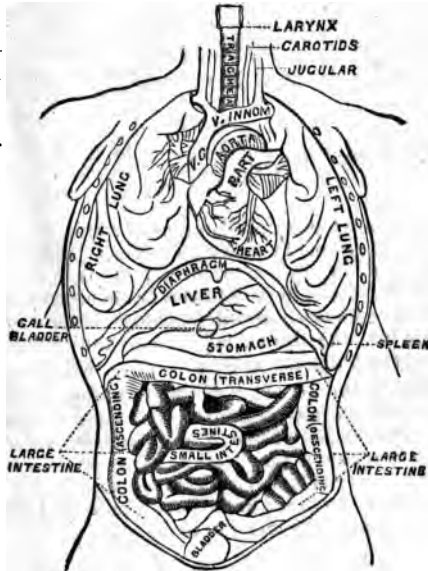
Larynx.

Trachea.

Bronchi.

Lungs.

The **LARYNX** is the upper portion of the air-passage, and the organ of voice. It is situated between the trachea and base of the tongue in the upper and fore-part of the neck



on either side are the large blood-vessels of the neck, and behind is the gullet. The larynx is a cartilaginous tube; and inside this tube are placed two narrow fibrous bands.

which are attached before and behind, with a chink between them for the passage of the air. The vibration of these bands by a forced expiration produces the *voice*.

The **TRACHEA**, or wind-pipe, is a cartilaginous and membranous tube, extending from the lower part of the larynx downwards to its division into the right and left bronchus—it lies in front of the neck, anterior to the gullet.

The **BRONCHI**, right and left, one to each lung, are formed by the division of the trachea.

The **LUNGS** are the essential organs of respiration; they are two in number, one in each side of the chest, separated by the heart, blood-vessels, bronchial tubes, and gullet. The lungs are enclosed in double sacs or coverings, termed *pleuræ*, and are composed of a light spongy texture for the ramifications of the bronchial tubes, the pulmonary arteries, and the pulmonary veins.

The bronchial tubes, after dividing and subdividing, terminate in minute air-cells, over which is spread a network of blood-vessels. It is in these minute blood-vessels that purification of the blood takes place, venous being converted into arterial blood. Carbonic acid and watery vapour pass from the blood into the air-cells, and oxygen passes from the air-cells into the blood.

MECHANISM OF RESPIRATION.—During an inspiration the chest is enlarged by elevating the ribs and depressing the *diaphragm*; and during an expiration the chest is dimi-

nished by depressing the ribs and elevating the diaphragm. The object in artificial respiration is to imitate the natural action.

The average capacity of the lungs is 250 cubic inches.

The amount of air (tidal air) taken in and passed out with each respiration is about 30 cubic inches.

Respiration takes place about 18 times per minute.

The VITAL CAPACITY is the greatest volume of air that can be expired after the deepest possible inspiration.

The difference in the vital capacity between a person dressed and undressed is probably about 60 cubic inches in favour of the latter. This is an important fact to recollect in employing artificial respiration.

VII.—THE ORGANS OF DIGESTION.

The organs of digestion consist of the Alimentary Canal and certain accessory organs. The Alimentary Canal is a musculo-membranous tube, about thirty feet in length, and comprises the following parts:—

Mouth.

Pharynx (back of throat).

Œsophagus (gullet).

Stomach.

Small intestines.

Large intestines.

The MOUTH, an oval-shaped cavity, contains the teeth, tongue, palate, and ducts of the salivary glands.

The PHARYNX lies at the back of mouth and top of gullet, behind the root of the tongue and larynx.

The **ESOPHAGUS**, or gullet, extends from pharynx to stomach, and is about nine inches long; it lies behind the windpipe, and in front of the spine.

The **STOMACH** is a pouch-like enlargement of the alimentary canal; it lies on the left side of body, under the diaphragm, with the liver on its right and the spleen on its left side. The stomach is the chief organ of digestion.

The **SMALL INTESTINE** is the continuation of the tube beyond the stomach; is a very tortuous canal; and is joined below to the large intestine.

The **LARGE INTESTINE** is a continuation of the small intestine; it ascends from a point near the right haunch-bone on the right side, crosses the abdomen under the liver and stomach, and then descends on the left side.

VIII.—THE ORGANS OF SECRETION.

Secretion is the process of elaborating special products from the blood, as saliva, bile, pancreatine, etc., to be further used in the economy. The Organs of Secretion are—

Liver.

Pancreas.

Salivary glands.

The **LIVER** is a large reddish-brown organ, situated chiefly under the false ribs on the right side of the body; its weight is about three to four pounds.

It is made up of lobes, lobules, and cells; it has a duct for conveying its secretion to its reservoir—the gall bladder.

The GALL BLADDER is the reservoir for the bile; it lies under the right lobe, and communicates with the intestinal canal below.

FUNCTIONS OF THE LIVER

1. Secretes bile, which aids digestion and acts as a purgative.
2. Purifies the blood.
3. Elaborates fat and sugar.

The PANCREAS, or *sweetbread*, is situated behind the stomach, in front of the spine; is made up of a number of small lobes; is about seven inches long; and weighs about four ounces. Its duct leads into the intestinal canal. The pancreatic juice aids digestion.

The SALIVARY GLANDS are situated about the sides of the face, neck, and tongue, and their ducts enter the cavity of the mouth. Their function is to secrete saliva, which keeps the mouth moist, and assists in the process of swallowing and digestion.

The SPLEEN is a ductless gland which lies on the left side under the false ribs; its function is connected with the blood in some way which has not yet been determined.

IX.—THE ORGANS OF EXCRETION.

Excretion is the process of elaborating special products from the blood to be thrown out of the system as useless. Such are carbonic acid, urea and uric acid. The Organs of Excretion are—

Lungs.

Skin.

Kidneys.

The LUNGS have been already described; their excretory function is to throw off carbonic acid and watery vapour.

The SKIN is the general covering of the body; it is composed of two layers—

Epidermis, Cuticle, or outer layer.

Derma, or true skin.

The skin is porous, contains sweat and fatty glands, and a free supply of nerves and blood-vessels.

The skin excretes the sweat, and is the organ of touch. In health it possesses a temperature of 98 deg.

The KIDNEYS are two in number, one situated in each loin (*small of back*). Externally is a fibrous layer or covering; internally is a cavity communicating with an excretory duct (ureter). The substance of the body consists of bundles of minute tubes. The ducts or ureters descend along the back wall of the abdomen, to terminate in the bladder. The *bladder* is the reservoir for the urine.

The function of the kidneys is to excrete urine, and to remove certain impurities from the blood, such as *carbonic acid, urea, and uric acid*.

PART II.

Medical and Surgical Outlines.

CHAPTER I.

INSENSIBILITY.

Insensibility is the suspension of the functions of animal life, except those of respiration and circulation.

Chief Causes of Insensibility:

Injuries to brain, compression from fracture.

Diseases of brain, apoplexy, epilepsy, &c.

Poisoning by narcotics—*opium, morphia, chloroform.*

Blood poisoning from kidney disease.

The above forms of insensibility are liable to be mistaken for drunkenness, and it ought to be remembered that these conditions may be complicated with each other and with the effects of drink, and that no single sign can be relied on in forming a conclusion on the condition of the patient.

EXAMINATION OF A PERSON FOUND INSENSIBLE.

When a person is found insensible the following directions are to be most carefully followed :—

1. Note the position of the body and its surroundings.
2. Obtain all information possible as to the cause.
3. Place the body on the back, with the head inclined to one side, the arms by the sides, and extend the legs.
4. Compare the two sides of the body.
5. In examining the head, pass the fingers gently over the surface, and search for wounds, bruises, swellings, or depressions.
6. Open the eyes, and ascertain if the surface of the eye-balls is sensitive to the touch, if the pupils become small when exposed to light; and whether the pupils are large or small, and of the same size.
7. Observe the state of the respiration, whether easy or difficult; the presence or absence of stertor; and the odour of the breath.
8. Notice the condition of the pulse, whether strong or weak.
9. Observe the general appearance and position of the limbs; and mobility, crepitus, shortening or lengthening of the bones of the limbs.
10. *Note the state of the ribs and collar-bones.*

IMPORTANT SYMPTOMS AND THEIR INDICATIONS.

CONVULSIONS occur in apoplexy, epilepsy, and kidney diseases; and in digestive disorders, and teething in children.

SHIVERING FITS usher in fevers, and indicate danger during illness.

PULSE is *weak* in cases of fainting, shock, collapse, and hæmorrhage.

Irregular in heart diseases.

Slow and labouring in cases of apoplexy and diseases causing pressure on brain.

PUPILS OF THE EYES are *fixed and dilated* in paralysis and apoplexy.

Unequal in size in serious disease or injury affecting one side of brain.

Contracted in cases of opium poisoning, and congestion or inflammation of the brain.

VIOLENT FITS indicate insanity, drunkenness, hysteria, or epilepsy.

HÆMORRHAGE FROM EAR, OR FROM MOUTH, NOSE, or EYES indicates fracture of base of skull.

FLUSHED FACE occurs in intoxication, apoplexy, and epilepsy.

GIDDINESS indicates stomach, liver, kidney, or brain-disorders.

STERTOROUS BREATHING is found in apoplexy and compression of brain.

DIFFICULTY IN BREATHING is a symptom of lung diseases, heart diseases, broken ribs, obstruction in air-passages, or injury to the nervous supply of these organs.

COUGH is a symptom of lung and heart diseases—irritation of air-passages, and pressure on lungs or on their nerves.

DRAWING OF FACE TO ONE SIDE

SQUINTING

FIXED CONDITION OF PUPILS (dilated)

IRREGULARITY IN THE SIZE OF PUPILS

TWITCHING OF THE MUSCLES ON ONE SIDE OF BODY

} Are evidence of Paralysis, from disease or injury of the nervous system.

STAGGERING GAIT indicates disease or injury of the brain or spinal cord; or intoxication.

CHAPTER II.

IMPORTANT DISEASES AND INJURIES OF THE HEAD.

The following conditions are of such frequent occurrence that their symptoms and treatment should be clearly *understood and remembered*.

TOXICATION.—*Cause:* Excess in drink.

Symptoms. Odour of liquor in breath. Insensibility usually not complete. Patient can usually be roused. No stertorous breathing. Pupils of equal size, and usually dilated (large). Cornea sensitive to touch. Temperature of body 2° to 3° below normal. Pulse soft and frequent. No difference between sides of body, both being equally helpless.

Treatment. Emetics; cold water applied to head; warmth to surface of body and extremities.

OPLEXY.—*Cause:* Effusion of blood producing pressure on the brain.

Symptoms. Patient becomes suddenly insensible.
Face flushed or very pale.
Pulse full.
Breathing stertorous.
Convulsions.
Paralysis.

Treatment. Place body in lying-down position, with the head raised. Undo clothing around neck. Apply iced or cold water to head. Act on the bowels.

PILEPSY.—*Cause:* Disease or disorder of brain.

Symptoms. Convulsions.
Foaming at mouth.
Biting tongue.
Partial insensibility.
Breathing and pulse normal.

Treatment. Prevent patient injuring himself.

BLOOD POISONING from kidney disease.*Symptoms* . Convulsions—insensibility.

Twitching of muscles.

Delirium.

Breath has a urinous odour.

Signs of dropsy.

Treatment . Hot air or vapour bath.

Active purgatives.

Ice to head.

OPIUM OR MORPHIA POISONING.*Symptoms* . Stupor; contracted pupils; progressive insensibility, which is seldom complete till convulsions or death occurs.*Treatment* . Emetics—cold douche to head and chest—walking exercise—strong coffee—artificial respiration.**SHOCK OR COLLAPSE.***Cause* . Injuries to nervous system by blows, operations, fright, grief, lightning. Death may be instantaneous; recovery may be slow or rapid.*Symptoms* . Face pale and pinched, eyes dull.

Pulse almost imperceptible.

Breathing very feeble; the functions of respiration and circulation are reduced to a minimum.

Treatment . Place patient in horizontal position, restore circulation and respiration, remove tight-fitting clothing from neck, apply warmth to surface of body and extremities; stimulants may be given cautiously in small quantities.

CONCUSSION OF BRAIN.—*Causes:* Blows or falls on head.

Symptoms. External bruises, &c.

Confusion of ideas.

Sickness.

Fainting; patient lies pale and shivering.

Stupor and partial insensibility.

Treatment. Place patient on his back, with head slightly raised, in a dark, quiet room—apply warmth to surface of body and extremities.

COMPRESSION OF BRAIN.

Causes. . . Pieces of bone or hæmorrhage pressing on substance of the brain.

Symptoms. Those of apoplexy, following some injury to head, such as fracture of the skull.

Treatment. The same as in apoplexy.

CHAPTER III.

TREATMENT OF CASES OF DROWNING, HANGING, SUFFOCATION BY GASES, SUNSTROKE.*

I.—DROWNING.—Send immediately for medical assistance, blankets, and dry clothing, but proceed to treat the patient INSTANTLY, securing as much fresh air as possible.

* The above directions are chiefly Dr. H. B. SILVERMAN'S method of restoring the Apparently Dead or Drowned, and have been approved by the Royal Medical and Chirurgical Society.

The points to be aimed at are—first, and immediately, the RESTORATION OF BREATHING; and secondly, after breathing is restored, the PROMOTION OF WARMTH AND CIRCULATION.

The efforts to restore life must be persevered in until the arrival of medical assistance, or until the pulse and breathing have ceased for at least an hour.

TREATMENT TO RESTORE NATURAL BREATHING.

Rule 1.—*To maintain a Free Entrance of Air into the Windpipe.*—Cleanse the mouth and nostrils; open the mouth; draw forward the patient's tongue, and keep it forward: an elastic band over the tongue and under the chin will answer this purpose. Remove all tight clothing from about the neck and chest.

Rule 2.—*To adjust the Patient's Position.*—Place the patient on his back on a flat surface, inclined a little from the feet upwards; raise and support the head and shoulders on a small firm cushion or folded article of dress placed under the shoulder-blades.

Rule 3.—*To imitate the Movements of Breathing.*—Grasp the patient's arms just above the elbow, and draw the arms gently and steadily upwards, until they meet above the head (this is for the purpose of drawing air into the lungs); and keep the arms in that position for two seconds. Then turn down the patient's arms, and press them gently and firmly for two seconds against the sides of the chest (this is with the object of pressing air out of the lungs. Pressure on the breast-bone will aid this).

Repeat these measures alternately, deliberately, and

perseveringly, fifteen times in a minute, until a spontaneous effort to respire is perceived, immediately upon which cease to imitate the movements of breathing, and proceed to INDUCE CIRCULATION AND WARMTH.

Should a warm bath be procurable, the body may be placed in it up to the neck, continuing to imitate the movements of breathing. Raise the body for twenty seconds in a sitting position, dash cold water against the chest and face, and pass ammonia under the nose. The patient should not be kept in the warm bath longer than five or six minutes.

Rule 4.—*To excite Inspiration.*—During the employment of the above method excite the nostrils with snuff or smelling-salts, or tickle the throat with a feather. Rub the chest and face briskly, and dash cold and hot water alternately on them.

TREATMENT AFTER NATURAL BREATHING HAS BEEN RESTORED.

Rule 5.—*To induce Circulation and Warmth.*—Wrap the patient in dry blankets and commence rubbing the limbs upwards, firmly and energetically. The friction must be continued under the blankets or over the dry clothing.

Promote the warmth of the body by the application of hot flannels, bottles or bladders of hot water, heated bricks, &c., to the pit of the stomach, the armpits, between the thighs, and to the soles of the feet. Warm clothing may generally be obtained from bystander

On the restoration of life, when the power of swallowing has returned, a teaspoonful of warm water, small quantities of wine, warm brandy and water, or coffee should be given. The patient should be kept in bed, and a disposition to sleep encouraged. During reaction large mustard plasters to the chest and below the shoulders will greatly relieve the distressed breathing.

II.—HANGING.—Remove all constrictions from neck and chest, and employ artificial respiration as for drowning.

III.—SUFFOCATION BY GASES.—Remove the patient into fresh air, undo clothing, and employ artificial respiration, as in drowning.

IV.—SUNSTROKE.—Cold should be applied to the head, which should be kept well raised. Tight clothing should be removed from the neck and chest. Stimulants should be avoided.

CHAPTER IV.

HÆMORRHAGE.

Hæmorrhage, or bleeding, is the result of the opening of a blood-vessel by a wound or otherwise. It may be external or internal.

Hæmorrhage is divided into—1, Arterial, where the blood flows in jets in great force, and is of a bright.

red colour. 2, *Venous*, where it flows slowly—wells out—and is of a dark purple hue. 3, *Capillary*, where there is a general oozing from the surface.

GENERAL TREATMENT OF HÆMORRHAGE.—Pressure is the most powerful means of arresting external hæmorrhage; and to use it effectively, it is important that the pressure should be directed against some bone as a point of resistance.

In all portions of the body where special treatment is not specified, direct pressure to the wounded part will be sufficient to arrest hæmorrhage till further assistance can be procured.

ARTERIAL HÆMORRHAGE is the most important and the most dangerous form of bleeding, and not a moment ought to be lost in giving help.

Treatment. 1. Expose and examine wound. 2. Wash with cold water. 3. Elevate the bleeding part, but place body in the lying-down position.

4. Apply pressure with the fingers directly over the mouths of the bleeding vessels till you can get further help.

5. Apply pressure to the main artery on the heart side, with the fingers or with a pad and bandage (tourniquet).

6. Apply a pad and bandage over wound as an additional safeguard.

VENOUS HÆMORRHAGE may occur along with arterial, or by itself. A superficial wound is more likely to divide veins than arteries. Dangerous venous bleeding often takes place where the patient has varicose veins and ulcers on the lower limbs.

(The direction of the flow of blood—towards the heart—just the reverse of what obtains in the arteries, is a fact which bears on the treatment.)

Treatment . 1. Expose and examine wound. 2. Wash well in cold water. 3. Elevate limb, keeping body in lying-down position. 4. Apply a pad and bandage on both sides of wound. 5. Remove any pressure or restriction to the circulation on the heart side, such as tight clothing (this cannot be done where arterial bleeding has also to be treated).

CAPILLARY HÆMORRHAGE is easily controlled.

Treatment . 1. Direct pressure to the bleeding surface. 2. Application of ice, or of styptics, such as alum, steel drops, caustics, &c., &c.

INTERNAL HÆMORRHAGE is seldom so rapid, except in cases of bursting of an aneurism, as not to give time for skilled aid.

Treatment . 1. Place patient in an easy recumbent position. 2. Apply ice to, or as near as possible to, the part affected.

3. Sucking ice is useful in bleeding about mouth, throat, or air-passages.

**SITUATION OF THE MAIN ARTERIES IN THE
DIFFERENT REGIONS OF THE BODY, AND
THEIR TREATMENT WHEN WOUNDED.***

REGIONS.	SITUATION OF VESSELS.	TREATMENT.
HEAD.	<i>Temporal</i> , in front of ear. <i>P. Auricular</i> , back of ear. <i>Occipital</i> , back of head.	Compress over the wound, and bandage.
NECK.	<i>Carotid Arteries</i> ascend in a line from inner ends of collar-bones to angles of jaw.	Digital compression in line of vessels above and below the wound, or directly into wound on the mouths of the bleeding vessels.
ARMPIT.	<i>Axillary Artery</i> lies across hollow space of armpit.	Compress sub-clavian artery behind middle of collar-bone, or digital pressure into the wound.
UPPER ARM.	<i>Brachial Artery</i> lies on inner side of arm, in a line with seam on coat sleeve—from inner fold of armpit to middle of bend of elbow.	Compress artery by a tourniquet above wound.

* Wounded veins should be treated according to rules laid down under
"Venous Hemorrhage"

REGIONS.	SITUATION OF VESSELS.	TREATMENT.
FORE-ARM.	<i>Radial and Ulnar Arteries</i> begin a little below the middle of bend of elbow, and descend one on each side of the front of the arm to the wrist.	Compress Brachial artery in the upper arm by a tourniquet, or place a pad in hollow of elbow and bend fore-arm against arm.
PALM OF HAND.	<i>Radial and Ulnar Arteries</i> give a number of branches, which spread out and supply the palm.	Apply two small firm pads to arteries at wrist, or forcibly close and fix hand over a piece of stick or hard substance, and bandage.
THIGH.	<i>Femoral Artery</i> , from middle of fold of groin runs down the inside of thigh in its upper two-thirds.	Pressure at middle of fold of groin, with the fingers or by tourniquet above wound.
HAM.	<i>Popliteal Artery</i> lies along middle of ham.	Compress popliteal artery above wound, or compress femoral artery in front of thigh by tourniquet.

REGIONS.	SITUATION OF VESSELS.	TREATMENT.
BACK OF LEG.	<i>Post. Tibial and Peroneal Arteries</i> descend the back and outside of leg from below ham, passing behind ankle-bones.	Compress at ham or in front of thigh or double leg on thigh with a pad in the ham.
FRONT OF LEG AND INSTEP.	<i>Anter. Tibial Artery</i> descends along middle of front of leg and instep.	Compress artery above wound.
SOLE OF FOOT.	<i>Post. Tibial and Peroneal</i> descend behind ankle-bones; the former supplies branches, which spread out on sole of foot.	Compress by a pad behind inner ankle-bone; if this fails, place pads behind outer ankle-bone and on middle of front of ankle.

CHAPTER V.

FRACTURES.

Fractures, or broken bones, may be divided into four classes :—

1. Simple Fracture; a simple break.
2. Compound Fracture; a flesh wound communicating with the broken ends of the bone.
3. Complicated Fracture; injuries to soft parts, blood-vessels, nerves, or internal organs.
4. Comminuted Fracture; smashing of bone into pieces.

A fracture may take place transversely, obliquely, or longitudinally.

Fractures are caused by violence.

SYMPTOMS OF FRACTURE.

The symptoms of fracture are—

1. Alteration in shape and general appearance.
2. Unusual mobility at seat of fracture.
3. Crepitus or crackling on placing one hand over the broken part, and creating motion with the other.
4. Shortening of limb.
5. Some inequality felt on running the fingers along the surface of the injured bone.

Fractures are distinguished from dislocations as follows :

FRACTURES.	DISLOCATIONS.
Crepitus.	No crepitus.
Unnaturally movable.	More or less fixed.
Easily replaced.	Replaced with difficulty.
Limb often shortened.	Limb may be shortened or
Seat of injury in the shaft or body of the bone.	lengthened.
	Seat of injury at a joint.

TREATMENT OF FRACTURES.

1. Reduce the fractured ends or portions to their natural position.
2. Retain them immovably in their proper places till nature has effected a permanent cure.

There is no urgency about treating a broken limb provided no attempt is made to move the person, but if it is imperative that the patient be moved in the absence of

a surgeon, it is an absolute necessity to secure the safety of the limb by putting it in splints before removal.

A stretcher is the only safe means of conveyance for cases of fracture.

Unskilful handling may cause either serious mischief or even loss of life; the dangers are pressing the sharp ends through the flesh, blood-vessels, nerves, or into some internal organ, such as the lungs.

SPECIAL FRACTURES.

FRACTURE OF THE SKULL.

Causes . Blows or falls.

Symptoms . External signs not always present. In fracture of the base there may be hæmorrhage from ear, mouth, or nose; red patches of blood under conjunctivæ of eyes; and oozing of watery fluid from the ears.

Accompanying these there may be symptoms of concussion, or symptoms of compression.

Treatment . Place patient in a dark and quiet room on his back, with head slightly raised. Apply cold to head as soon as reaction sets in and patient gets hot and feverish.

FRACTURE OF LOWER JAW.

Causes . Direct blows; falls on chin.

Symptoms . Irregularity in the line of the teeth and the outline of the lower margin of bone; inability to move jaw.

Treatment . Fix lower jaw to upper jaw by a bandage.

RACTURE of COLLAR-BONE.

Causes . Blows on shoulder ; falls on elbow or hand.

Symptoms . Shoulder drops.

Arm is helpless.

Irregularity on drawing finger along surface of bone.

Treatment . Place a pad in armpit, bind arm to side just above elbow, and sling forearm.

FRACTURE OF RIBS.

Causes . Blows, falls, weight passing over chest or back.

Symptoms . Pain and difficulty in breathing, and the usual signs of fracture.

Treatment . Apply a broad roller bandage firmly round chest, so as to prevent all movement ; or strap the injured side with adhesive plaster.

FRACTURE OF THE HUMERUS.

Causes . Direct blows, falls on elbow.

Symptoms . Mobility at seat of fracture.

Crepitus.

Shortening, usually present when fracture is oblique.

Treatment . Apply a roller bandage from hand to elbow, abduct arm and apply three or four splints from shoulder to elbow. Support arm in a sling.

FRACTURE OF THE FORE-ARM.

Causes . Direct violent blows, falls.

Symptoms . Crepitus.

Mobility.

Alteration in shape of arm.

Treatment . Semiflex fore-arm with thumb pointing upwards. Apply two splints, one in front from bend of elbow to the tips of the fingers, and one behind from elbow to wrist.

The splints should be well padded.

Place arm in sling.

FRACTURES ABOUT WRIST AND HAND.

Causes . Blows or other injuries.

Symptoms . Pain, swelling.

Irregularity in the outline of the bones.

Crepitus.

Treatment . Bandage to a flat board or splint, and support by sling.

FRACTURE OF FEMUR OR THIGH-BONE.

Causes . Blows, falls.

Symptoms . Pain and loss of power.

Crepitus.

Shortening.

Broken ends may be felt.

Foot turned out.

Treatment . Extend the limb, apply a long splint on outside along the whole side, from the armpit to the outside of the heel, and another on the inside of the thigh, from top of the inside of the thigh to the knee.

FRACTURE OF PATELLA OR KNEE-CAP.

Causes . Blows, or excessive muscular action.

Symptoms . Inability to stand upon leg.

Fragments can be felt.

Treatment . Raise limb to a position at right angles to body, and apply a figure-of-eight bandage around the knee, including the fragments.

FRACTURE OF BONES OF THE LEG.

Causes . Blows, falls, crushing weight, such as wheels, passing over the limb.

Symptoms . Pain and loss of power.

Alteration in shape.

Crepitus.

Broken ends may be felt.

Treatment . Apply two splints, one inside and one outside the limb.

Elevate limb.

FRACTURES ABOUT FOOT AND ANKLE.

Causes . Blows or other injuries.

Symptoms . Pain, swelling.

Alteration in outline of bones.

Crepitus.

Treatment . Elevate foot; apply cold water.

N.B.—It must be remembered that the treatment for fractures here given is only temporary, to enable the patient to be moved without further injuries, which might result in the loss of the limb or even life, till a surgeon can be sent for.

The treatment for dislocations is purposely omitted, as *being dangerous, except in the hands of a surgeon.*

CHAPTER VI.

WOUNDS.

INCISED WOUNDS.

- Treatment* . 1. Wash the part carefully with water
 2. Arrest the hæmorrhage.
 3. Adjust the edges and fix in a natural position.
 4. Place patient in an easy position, so as to avoid straining the parts. In wounds of throat, sand-bags are good supports for fixing head and neck.
 5. Apply cold water dressing, or strips of adhesive plaster.

INCISED WOUNDS, WITH PROTRUSION OF INTERNAL ORGANS.

- Treatment* . Wash the parts carefully, and return, unless they are much injured, and place patient in a thorough state of rest.

In incised wounds about the face it is very important to replace the wounded portions with as little delay as possible.

CONTUSED AND LACERATED WOUNDS are more dangerous and troublesome to heal, besides being liable to erysipelas, gangrene, &c.

- Treatment* . Wash.
 Arrest hæmorrhage.
 Replace parts in their natural position.
 Apply cold water dressings or poultices.

Lacerated and contused wounds about the head are very liable to erysipelas. Cold water dressings, when carefully attended to, and not allowed to dry, are very suitable where there is bleeding. If there is no tendency to bleeding, poultices are probably the safer remedy, as they do not allow the wound to become dry and inflamed.

FOREIGN BODIES IN THE EYE.—If the foreign body is under the upper eye-lid, seat the patient in a chair, and standing behind, place a pencil over the lid; lay hold of the eye-lashes, and evert the lid. Then, having exposed the substance, brush it off with the corner of a handkerchief or a camel's hair brush. If it is under the lower eye-lid, simply depress this, and proceed as above with handkerchief or brush.

FOREIGN BODIES IN THE EAR.—The canal leading to the inside of the ear is about an inch and a quarter in length, and at the inner end of this canal is placed the drum of the ear, a very thin delicate membrane, resembling a piece of tissue paper.

A blow on the ear with the open hand, or the concussion from the discharge of firearms, is quite sufficient to rupture and destroy this membrane. No interference, therefore, with the ear, beyond using a syringe, should be attempted, except by a surgeon. Such substances as accumulations of wax, pieces of slate pencil, insects, &c., may be removed by syringing with tepid water. It will be well, however, to remember that peas and porous substances would be rendered more difficult of removal *after the use of the syringe.*

BURNS AND SCALDS.—A *burn* is caused by concentrated heat, fire directly applied to surface, or chemical agents, destroying the skin and the tissues underneath.

A *scald* is produced by hot or boiling liquids touching the skin; the cuticle or scarf skin is raised and destroyed, and the true skin reddened and inflamed.

Besides their local action, burns and scalds are apt to produce dangerous effects by congestion of internal organs.

Treatment of Burns.—Apply a mixture of oil and lime-water, olive oil, castor oil, or castor oil and collodion; and wrap up the part in cotton wool, wool, or flannel.

Treatment of Scalds.—Apply a strongly alkaline solution made with the carbonate of soda, lime, or magnesia; and enclose the limb, or part, in cotton wool, excluding air as far as possible.

N.B.—Troublesome contracting scars, causing deformity, often follow burns; it is therefore important to make the patient lie in a natural position, and avoid twisting the neck or doubling up the limbs.

FROST-BITE.—Frost-bite is the result of exposure to severe cold. The vitality of the part is reduced to a very low point, loses its natural colour, and becomes blue or purple.

Treatment. Bring about reaction gradually by friction. Place the patient in a room without a fire, and avoid heat. Rub the part with snow or other cold application, and administer brandy in water carefully in small quantities.

BED SORES are the result of pressure from lying in one position. They may be *prevented* by hardening the skin by rubbing it with brandy, salt and water, &c., applying adhesive plaster spread on leather, or the use of air- or water-cushions.

BITES OF RABID ANIMALS.

Treatment . If possible immediately apply a ligature on the side nearest the heart; suck the wound; bathe it with warm water, so as to encourage bleeding; scarify around the wound to the depth of a quarter of an inch; use caustics, such as nitrate of silver or carbolic acid.

The internal use of brandy and ammonia is advisable.

CHAPTER VII.

MATERIAL AND APPLIANCES FOR THE RELIEF OF THE SICK AND INJURED.

THE ORDER OF ST. JOHN LITTER is a combined stretcher and wheeled ambulance. It obtained the medal of the Sanitary Institute of Great Britain, as well as the prize medal at the Brussels Exhibition. It is the best of its kind, and is a most useful conveyance for sick and wounded in the field, for colliery districts, railways, or for street accidents. The Metropolitan Police have recently adopted this litter as their regulation ambulance, and have placed it at *their stations* for the use of the public.

STRETCHERS.—A stretcher is simply a light portable bed for carrying the sick; it is composed of a framework of poles, with a piece of canvas stretched between them as a mattress.

The "Beaufort" is the most improved and best pattern of stretcher. Our Army regulation stretcher is about the worst and the least serviceable, owing to its faulty construction and great weight.

A variety of things will answer as substitutes for a stretcher, such as doors, window shutters, ladders, or hurdles.

TO PLACE A MAN ON A STRETCHER WITH THREE BEARERS

1. The three men fall in facing the feet of the injured man, and are numbered off from the right.
2. Put the foot of the stretcher at the man's head, in a line continuous with his body.
3. Nos. 1 and 2, one at either side, locking hands underneath the shoulders and hips, raise the patient; carry him forward over the stretcher; and then lower him on to it.
4. No. 3 takes charge of the injured portion (*limb or head*), and steadies it with a hand on either side of the wound.
5. Nos. 1 and 2 then take their places at head and foot of stretcher, lift and carry off, while No. 3 walks at the side of the stretcher as a safeguard to the patient, and as a relief to No. 1 or 2 if necessary.

RULES FOR CARRYING A STRETCHER.

1. Carry stretcher in hands, or suspend it by straps over the bearers' shoulders.
2. Never allow the stretcher to be placed on the shoulders.

3. Bearers to march in broken step, and not in time.
4. Avoid all jolting, crossing fences, ditches, &c.
5. Pace to be about 20 inches.
6. In ascending, patient's head to be in front, and in descending, behind.

SPLINTS.—Splints are appliances used in treating fractures, for supporting the bones in their natural position till a cure is effected.

The materials chiefly used for making splints are wood, iron, pasteboard, leather, gutta percha, felt, wire, tin, and bark. Extemporised splints may be formed with umbrellas, walking-sticks, cigar boxes, folded newspapers, policemen's truncheons, and soldiers' weapons, such as rifles, swords, or bayonets.

PADS.—Splints should be well padded with wool, cotton wool, tow, flannel, or lint.

BANDAGES are usually made from unbleached calico, flannel, linen, webbing, &c.

Bandages are used—

1. As supports to the different parts of the body.
2. As means of applying pressure.
3. For fixing splints, dressings, &c.
4. To allay muscular action.

The chief kinds of bandages are the roller bandage and the triangular bandage.

A combination of splint and bandage is made by saturating ordinary bandages with plaster of Paris, glue, starch, starch and gum, chalk and gum, or silicates of soda and potash (*glass splint*).

These bandage-splints, being put on moist, and allowed to dry, whilst they are kept in position, have the advantage of being very immovable, and well adapted to the surface of the parts to which they are applied.

ROLLER BANDAGES have certain convenient sizes, according to the part of the body for which they are required, as follows:—

- For the fingers, $\frac{3}{4}$ inch wide and 1 yard long.
- „ arm, $2\frac{1}{2}$ inches wide and 3 to 6 yards long.
- „ leg, 3 inches wide and 6 to 8 yards long.
- „ chest, 4 to 5 inches wide and 8 to 12 yards long.
- „ head, $2\frac{1}{2}$ inches wide and 4 to 6 yards long.

In *applying a roller bandage*: 1. Begin from below and work upwards. 2. Insure that the pressure is uniformly and evenly applied. 3. Avoid wrinkles. 4. Bandage from within outwards. 5. Reverse on the fleshy side of the limb, and not over the sharp edges of a bone. 6. Where the limb is of uniform thickness use the *simple spiral*; where the limb thickens use the *reverse spiral*; and at joints use the *figure-of-eight*.

The application of bandages is best learnt by a practical lesson.

ESMARCH'S TRIANGULAR BANDAGE is a triangular piece of cloth; the lower border measures 4 feet, and the two side borders 2 feet 10 inches each.*

It can be applied in thirty-two different ways; it answers every purpose for temporary dressings or field work; and the means of making one are always at hand, namely, a pocket-handkerchief cut diagonally in two.

Its application is so easy, that a look at the diagram will enable any one to use it in the manner indicated.

MATERIALS USED IN DRESSING WOUNDS are adhesive plasters, oiled silk, gutta-percha tissue, lint, charpie, oakum, tow, cotton wool, &c., &c.

* A triangular bandage, with figures illustrating its use, can be obtained from the Order of St. John.

Adhesive plasters are used for keeping the edges of wounds in position, and for fixing dressings in lieu of bandages.

Oiled silk and gutta-percha tissue are used over other dressings to retain moisture, to prevent the escape of liquid applications, and to protect the part from any external impurities.

STIMULANTS.

The stimulants in ordinary use are : *internally*, tea, beef tea, brandy, and coffee. *Externally*, friction, smelling-salts to nostrils, mustard to extremities, cold affusion, and slapping the face with a wet towel.

POULTICES.

The use of poultices is to apply and retain heat and moisture, clean foul wounds, allay pain, draw the circulation of the blood towards the surface from internal organs, and to encourage suppuration in abscesses.

They may be made from bread, linseed, or other meals; charcoal, mustard, carrots, onions, &c., &c.

LEECHES.

In applying leeches, observe the following rules :—

1. Thoroughly clean the part.
2. Use an inverted wine-glass; or, if to the inside of the mouth, use the leech-glass made for that purpose.
3. If it is necessary, bleeding may be further encouraged by using a poultice afterwards.
4. Take care that bleeding does not become too abundant, an event which may happen with children. If it does, the hæmorrhage may be *arrested by exposing the part to the air, and applying cold or pressure.*

CHAPTER VIII.

DISINFECTION.

The terms *infectious* and *contagious* (*catching*) applied to a disease signify that it is communicable from the sick to the healthy.

The following are the principal infectious diseases:—

Eruptive fevers—measles, small-pox, and scarlet fever
Continued fevers—typhus, typhoid, relapsing and yellow fevers. Diphtheria, erysipelas, whooping cough, and cholera.

DISINFECTANTS are materials used for the purpose of purifying the air, water, soil, &c., by removing or rendering inert certain noxious substances; they may be divided into—

- a. Volatile or gaseous.
- b. Solid or liquid.

VOLATILE OR GASEOUS.

{ Chlorine.
Bromine. .
Iodine.
Sulphurous acid.
Nitrous acid.
Fresh air.
Oxygen.
Ozone.
Camphor.
Extreme heat or cold

SOLID OR LIQUID.

Chlorides of metals, alkalies.
Sulphates do. do.
Nitrates.
Carbolic acid and carbolates.
Tar acids.
Charcoal.
Salt.
Dried earth.

The most common patent disinfectants are :—

Condy's fluid.
Burnett's fluid.
Ledoyen's fluid.
Dougall's powders.
Sirel's compounds.

RULES FOR DISINFECTING AN UNOCCUPIED ROOM.

1. Close every door and window, and stop up every opening or crevice with old rags or tow.
2. Fumigate by any of the following methods :—
 - (1.) By CHLORINE.—Place a few saucers in different parts of the room, containing a mixture of one part of common salt, one part of black oxide of manganese, and two parts of oil of vitriol.
 - (2.) By IODINE.—Place two drachms of iodine in a metal cup or vessel, and place a lamp or burning candle underneath it till it evaporates.
 - (3.) By SULPHURUS ACID.—Burn sulphur in saucers.
 - (4.) By NITROUS ACID FUMES.—Place several cups into saucers or basins containing hot water, and inside the cups put two ounces of nitrate of potash and one ounce of sulphuric acid.
 - (5.) By CARBOLIC ACID.—Place some pure carbolic acid in shallow vessels around the room.

3. Furniture and floors to be well washed or scrubbed with a solution of chloride of lime; the latter may be sprinkled with the powdered chloride of lime or Dougall powder.

4. Papers to be stripped from the walls, and the wall and ceilings to be white-washed.

5. All clothing to be disinfected by washing, boiling, baking in an oven, or exposure to the sun or before a fire if a disinfecting establishment is not available.

6. Curtains and carpets are best disinfected by exposure to a heat of from 200 deg. to 400 deg.

7. In extreme cases, destroy by fire all clothing, bedding, carpets, &c.

RULES FOR DISINFECTING AN OCCUPIED ROOM.

1. Maintain a proper state of ventilation by doors, windows, and outer openings.

2. Keep up a good fire in the room.

3. Use Condry's fluid, Burnett's fluid, or solutions of chloride of lime for utensils in room, closet &c.

4. Disinfect all clothing, linen, &c., before it leaves the room, as laid down (in rule 8 for preventing spread of diseases).

5. Fumigate room cautiously with either chlorinate lime or carbolic acid, placed in saucers in different parts of the room.

Be careful not to use gases or vapours too freely, as they are liable to cause inconvenience to the patient, by irritation of his lungs or air-passages.

RULES FOR THE PREVENTION OF THE SPREAD OF INFECTIOUS DISEASES.

1. Decide as to sending the patient to a hospital or treating the cases in the house.
2. If a case for the hospital, apply to the Vestry for a special conveyance, and do not under any circumstances employ a public carriage.
3. After the removal of the infected person, fumigate and disinfect rooms occupied (*vide* instructions for disinfecting unoccupied rooms).
4. If a case for treatment at home, clear the house as far as possible of all inmates except the attendants on the sick, and secure the services of a trained nurse.
5. Remove carpets, curtains and all superfluous furniture.
6. If small-pox, vaccinate every one in any way exposed to infection.
7. Allow as much fresh air as possible without creating draughts, and keep a good fire burning day and night in the room.
8. Use disinfectant solutions in all utensils and slop pails. Place soiled clothes and linen in a disinfectant solution, or boil with soda for several hours before they are taken from the room.
9. Open doors or windows are to be curtained with sheets kept moist with carbolic acid and water.
10. Drains, sinks, and closets to be flushed at least once a day with disinfectants.
11. Every room that has been occupied by an infected person should be thoroughly purified before it is *reoccupied*.

12. During convalescence patients should have tepid or warm baths, medicated with some suitable disinfectant, such as Condy's fluid. This is very useful in cases of scarlet fever.

CHAPTER IX.

BATHS.

The following are the principal kinds of baths :—

Bath.	Water. Degrees.	Vapour. Degrees.	Air. Degrees.
The Cold ...	33 to 65		
Cool	65 to 75		
Temperate	75 to 85		
Tepid ...	85 to 92	90 to 100	96 to 106
Warm ...	92 to 98	100 to 115	106 to 120
Hot	98 to 112	115 to 140	120 to 180

The COLD BATH chills the surface, contracts the blood-vessels, forces the circulation from the surface to the internal regions, and checks perspiration ; when not too prolonged, and the individual is in robust health, these effects are followed by a reaction, and a pleasant feeling of warmth.

Its general effect on the system is bracing and tonic.

The dangers are congestions of internal organs.

SHOWER BATH is similar to the cold bath in its effects ; probably somewhat more bracing.

COLD AFFUSION is the application of a stream of cold water from a height; it produces a sudden and violent stimulating effect, and is useful for rousing persons from states of insensibility, suffocation, drunkenness, hysteria, and poisoning. It is sometimes useful for producing sleep in delirium tremens or drunken mania.

THE WET COMPRESS acts as a local bath, and gives a combination of effects; it first acts as a cold bath, and secondarily as a prolonged warm bath; its effects are very soothing.

ICE AND ICED WATER applied locally produce contraction of the blood-vessels, and drive the blood away from the part. They are useful for reducing swelling and inflammation, and arresting hæmorrhage.

THE TEPID, WARM, AND HOT BATHS act as stimulants; they increase the circulation in the surface of the body, relieve congested internal organs, and promote secretion and excretion. The repeated or prolonged use of hot baths has a very weakening effect on the body; they relax the tissues and weaken the nervous system.

HOT FOMENTATIONS are simply local hot baths, and act in a similar way; they are useful for relieving pain.

ACID BATHS are useful in liver and malarious diseases. Add three ounces of nitro-hydrochloric acid to thirty gallons of water, using a wooden tub.

DISINFECTANT BATHS should always be used during convalescence from infectious diseases, and for several *days before the invalid is allowed to join his family.* Add eight ounces of Condyl's fluid to 16 to 30 gallons of *water (tepid or warm).*

ALKALINE BATHS are useful in cases of gout and rheumatism. Add a pound of carbonate of soda to 30 gallons of water.

N.B.—Persons in delicate health who cannot bear a cold bath may manage to do so by getting into warm or tepid water, and then gradually lowering the temperature; by this plan a sudden chilling of the surface is avoided, and the benefits of a combined hot and cold bath are obtained with safety.

CHAPTER X.

POISONS.

Poisons are substances capable of destroying life. They are divided into classes, according to their action on the body.

1. *Irritants* destroy the tissues, and produce nervous shock.
2. *Narcotics* produce insensibility by their action on the brain.
3. *Narcotico-irritants* combine the action of narcotics and irritants.

Treatment.—The points to be kept in view in poisoning are :

1. To get rid of the poison by encouraging vomiting.
2. To counteract the effects of the poisons by antidotes, which will mechanically or chemically render the poison harmless.
3. To remedy the effects produced, and obviate the tendency to death by stimulants, artificial respiration, and exciting the excretory organs.

EMETICS.—Emetics are remedies used for the purpose of causing vomiting. The safest and readiest are—irritating back of throat with the finger or a feather; large draughts of tepid water combined with a table-spoonful of salt or mustard; one or two tablespoon-fuls of ipecacuanha wine in water; and twenty grains of sulphate of zinc in water.

ACIDS AND ALKALIES form antidotes to each other.

The acids suitable for the purpose are vinegar, lime juice, and orange juice, mixed with water.

The alkalies are soda, potash, lime, and magnesia diluted with water.

ALBUMEN AND OILS will protect the gullet and walls of the stomach in poisoning by irritants. White of egg, milk, flour and water, salad oil, and castor oil may be used.

The **STOMACH PUMP** cannot be used except by a surgeon but a very good substitute can be found in a piece of gutta-percha tubing, provided the patient is not in an insensible condition. Take three yards of elastic gutta percha tubing, about half-an-inch in diameter, make the patient swallow about 20 to 25 inches of it; raise the free end above his head, and pour down a pint of water, or as much as the stomach will receive. Then lower the free end, and it will empty itself; repeat the filling and emptying as often as you think necessary. This remedy is perfectly safe and effectual; it has been used by German physicians for disorders of the stomach with considerable success. The *swallowing* of the tube can be done with the *greatest facility, without assistance and without danger.*

POISONS.

ANTIDOTES.

ARSENIC	Emetics; milk; peroxide of iron; raw eggs; castor oil; salad oil.
ANTIMONY (<i>Butter of Antimony and Tartar emetic</i>).	Encourage vomiting. Milk; tea; tannic acid.
MINERAL ACIDS (<i>Oil of Vitriol, Aqua fortis, Spirit of Salt</i>).	Encourage vomiting. Alkalies—solutions of soda; potash; lime; magnesia; whiting; wall plaster.
OXALIC ACID.	
CARBOLIC ACID.	
ALKALIES (<i>Caustic Potash, Soda or Lime</i>).	Acids—vinegar and water; lime juice; orange juice in water; emetics; salad oils.
PHOSPHORUS — (<i>Rat Poison</i>).	Encourage vomiting by large draughts of water. Large doses of magnesia in water. Avoid oils.
MERCURY SALTS (<i>Corrosive Sublimate, Calomel</i>).	Encourage vomiting; white of eggs; flour and water; milk.
SALTS OF LEAD (<i>Sugar of lead, paint</i>).	Emetics and Epsom salts.
NITRATE OF SILVER— CAUSTIC.	Common salt and water.

POISONS.

ANTIDOTES.

IRRITANT GASES . . . (<i>Chloroform</i>).	Fresh air ; loosen dress ; artificial respiration ; dash cold water about face and neck.
PRUSSIC ACID	Cold douche ; smelling salts to nostrils ; artificial respiration ; brandy and ammonia.
STRYCHNIA	Emetics ; chloroform to relieve spasms ; cold affusion ; artificial respiration ; brandy and ammonia.
NARCOTICS (<i>Opium</i> , <i>Morphia</i>).	Emetics ; strong coffee ; cold affusion ; forced walking about.
ALCOHOL	Emetics ; cold affusion ; warmth to surface of body ; a dessertspoonful of vinegar in water.

CHAPTER XL

MODES OF DEATH.

Death may occur in three different ways, according as it begins in the heart, lungs, or head.

1. Heart—by *asthenia*, as in *hæmorrhage*.
2. Lungs and air-passages — by *asphyxia*, as in *drowning*.
3. Head—by *coma*, as in *apoplexy*.

SIGNS OF DEATH.

The most obvious signs of death are—

Cessation of breathing—no movement of chest—no moist breath to dim a looking-glass placed before mouth.

Cessation of heart's action—no impulse against side or pulse beating in arteries.

Eyelids half closed, eyes dim and glassy, pupils dilated.

Jaws clenched.

Tongue appearing between teeth.

Frothy mucus about nose and mouth.

Fingers half closed.

Surface of body pale and cold.

Body rigid after a time.

CAUSES OF SUDDEN DEATH.

The chief causes of sudden death are—

Apoplexy.

Aneurism.

Heart disease.

Suffocation.

Shock.

Injuries to the nervous system.

Sunstroke.

Struck by lightning.

Poisoning.







Directions for Restoring the Apparently Drowned.

THE leading principles of the following Directions for the Restoration of the Apparently Dead from Drowning are founded on those of the late DR. MARSHALL HALL, and are the result of extensive inquiries which were made by the Royal National Lifeboat Institution in 1863-4 amongst Medical Men, Medical Bodies, and Coroners throughout the United Kingdom. These Directions have been extensively circulated by the INSTITUTION throughout the United Kingdom and in the Colonies. They are also in use in Her Majesty's Fleet, in the Coastguard Service, and at all the Stations of the British Army at home and abroad.

I.

SEND immediately for medical assistance, blankets, and dry clothing, but proceed to treat the Patient *instantly* on the spot, in the open air, with the face downward, whether on shore or afloat; exposing the face, neck, and chest to the wind, except in severe weather; and removing all tight clothing from the neck and chest, especially the braces.

The points to be aimed at are—first and *immediately*, the RESTORATION OF BREATHING; and secondly, after breathing is restored, the PROMOTION OF WARMTH AND CIRCULATION.

The efforts to *restore Breathing* must be commenced immediately and energetically, and persevered in for one or two hours, or until a medical man has pronounced that life is extinct. Efforts to promote *Warmth* and *Circulation*, beyond removing the wet clothes and drying the skin, must not be made until the first appearance of natural breathing; for if circulation of the blood be induced before breathing has recommenced, the restoration to life will be endangered.

II.—TO RESTORE BREATHING.

TO CLEAR THE THROAT.—Place the patient on the floor or ground with the face downwards, and one of the arms under the forehead, in which position all fluids will more easily escape by the mouth, and the tongue itself will

forward, leaving the entrance into the windpipe free. Assist this operation by wiping and cleansing the mouth.

If satisfactory breathing commences, use the treatment described below to promote Warmth. If there be only slight breathing—or no breathing—or if the breathing fail. then—

TO EXCITE BREATHING—Turn the patient well and instantly on the side, supporting the head, and excite the nostrils with snuff, hartshorn, and smelling salts, or tickle the throat with a feather, &c., if they are at hand. Rub the chest and face warm, and dash cold water, or cold and hot water alternately, on them. If there be no success, lose not a moment, but instantly—

TO IMITATE BREATHING—Replace the patient on the face, raising and supporting the chest well on a folded coat or other article of dress. Turn the body very gently on the side and a little beyond, and then briskly on the face, back again, repeating these measures cautiously, efficiently, and perseveringly, about fifteen times in the minute, or once every four or five seconds, occasionally varying the side.

(By placing the patient on the chest, the weight of the body forces the air out; when turned on the side, this pressure is removed, and air enters the chest.)

On each occasion that the body is replaced on the face, make uniform but efficient pressure with brisk movement, on the back between and below the shoulder-blades or bones on each side, removing the pressure immediately before turning the body on the side. During the whole of the operations let one person attend solely to the movements of the head and of the arm placed under it.

(The first measure increases the expiration—the second commences inspiration.) The Result is *Respiration* or *Natural Breathing*; and if not too late, *Life*.

Whilst the above operations are being proceeded with, dry the hands and feet, and as soon as dry clothing or blankets can be procured, strip the body, and cover or gradually reclothe it, but taking care not to interfere with the efforts to restore breathing

INDEX.

- ACID BATHS**, 62
 „ carbolic, antidotes to, 65
 „ oxalic, antidotes to, 65
 „ prussic, antidotes to, 66
Acids, mineral, antidotes to, 65
Acids and alkalies, 64
Adhesive plasters, 56
Affusion, cold, 62
Air, water, soil, &c., materials for purifying, 57
Albumen and oils, 64
Alcohol, antidotes to, 66
Alimentary canal, 25
Alkalies, antidotes to, 65
Alkalies and acids, 64
Alkaline baths, 63
Anatomical and Physiological Outlines, 4
Animals, bites of rabid, 52
Ankle and foot, fractures about, 48
Antidotes to poisons, 65
Antimony, antidotes to, 65
Apoplexy, 33
Arm (fore), fracture of, 47
Arsenic, antidotes to, 65
Arterial hæmorrhage, 39
Arteries, 16
 „ situation of, and treatment when wounded, 41
Arteries and veins, difference between, 17
- BANDAGE and SPLINT**, combination of, 54
Bandages, 54
 „ sizes of, 55
Baths, acid, 62
 „ alkaline, 63
 „ cold, 61
 „ disinfectant, 62
 „ shower, 61
 „ tepid, warm, and hot, 62
 „ temperatures of, 61
Bearers, how to place a man on a stretcher with three, 53
Bed sores, 52
Bites of rabid animals, 52
Blood, composition of, 14
Blood and organs of circulation, 13
Blood poisoning from kidney disease, 34
Body, the human, 3
Bones, broken, 43
 „ of leg, fracture of, 48
Brain, 9
 „ compression of, 35
 „ concussion of, 35
Breathing, difficulty in; a symptom of, 32
Breathing, stertorous, 32
Broken bones, 43
Burns and scalds, 51

- CANAL**, alimentary, 25
Capacity, vital, 25
Capillary hæmorrhage, 40
Carbolic acid, antidotes to, 65
Caustic, antidotes to, 65
Chill, how to avoid in use of bath, 63
Chloroform, antidotes to, 66
Circulation, organs of, 13
 " tabular view of, 15
Cold affusion, 62
 " bath, 61
Collapse, 84
Collar-bone, fracture of, 46
Comminuted fracture, 43
Complicated fracture, 43
Compound fracture, 43
Compress, wet, 62
Compression of brain, 35
Concussion of brain, 35
Congestion of internal organs
 apt to follow burns and
 scalds, 51
Contused and lacerated wounds,
 49
Conveyance, stretcher only safe
 means in cases of fracture, 45
Convulsions, 31
Cough, a symptom of, 32

DEATH, cases of sudden, 66
 " causes of sudden, 67
 " signs of, 67
Difficulty in breathing, a symp-
 tom of, 32
Digestion, organs of 25

Diseases, infectious, 57
 " rules for pre-
 " venting spread of, 60
Diseases and injuries of the
 head, 32
Disinfectant baths, 62
Disinfectants, 57
Disinfecting an occupied room,
 rules for, 59
Disinfecting an unoccupied room,
 rules for, 58
Disinfection, 57
Dislocations distinguished from
 fractures, 44
Dislocations, treatment of, dan-
 gerous except in hands of
 surgeon, 48
Dressings for wounds, 55
Drowning, 35
Drunkenness, insensibility liable
 to be mistaken for, 29

EAR, danger of interference with,
 50
 " foreign bodies in, 50
Emetics, 64
Epilepsy, 33
Erysipelas, wounds about head,
 liable to, 50
Esmarch's triangular bandage, 51
Excretion, organs of, 28
Eye, foreign bodies in, 50
Eyes, pupils of: indications from,
 [31]
FACE, flushed, 31
Femur, fracture of, 47

Flushed face, 31
 Fits, shivering, 31
 " violent, 31
 Fomentations, hot, 62
 Foot and ankle, fractures about, 48
 Fore-arm, fracture of, 47
 Foreign bodies in the ear, 50
 " " " eye, 50
 Fracture, comminuted, 43
 " complicated, 43
 " compound, 43
 " simple, 43
 " stretcher only safe means
 of conveyance in cases of, 45
 Fracture, symptoms of, 44
 " of collar-bone, 46
 " of bones of leg, 48
 " of femur or thigh-bone,
 47
 " of fore-arm, 47
 " of humerus, 46
 " of lower jaw, 45
 " of patella or knee-cap,
 48
 " of ribs, 46
 " of skull, 45
 Fractures, 43
 Fractures about foot and ankle, 48
 " about wrist and hand, 47
 " distinguished from dis-
 locations, 44
 Fractures, treatment of, 44
 Frost-bite, 51
 GASES, irritant, antidotes to, 66
 " suffocation by, 88

Giddiness, a symptom of, 31
 Gutta-percha tissue, 56
 HAND & WRIST, fractures about, 47
 Handling, unskilful: danger of,
 in cases of fracture, 45
 Hanging, 38
 Hæmorrhage, arterial, 39
 " capillary, 40
 " from ear, mouth,
 nose, or eyes: indications
 of, 31
 Hæmorrhage, general treatment
 of, 38
 Hæmorrhage, internal, 40
 " venous, 40
 Head, diseases and injuries of, 32
 Heart, 14
 Hot bath, 62
 " fomentations, 62
 Human body, 8
 Humerus, fracture of, 46
 ICE and ICED WATER, 62
 Incised wounds, 49
 " " with protrusion
 of internal organs, 49
 Infectious diseases, 57
 " " rules for pre-
 venting spread of, 60
 Injuries and diseases of the
 head, 32
 Insensibility, 29
 " causes of, 29
 " examination of a
 person found insensible, 30

- Insensibility:** important symptoms and their indications, 31
Insensibility liable to be mistaken for drunkenness, 29
Internal hæmorrhage, 40
 " organs, diagram of, 23
Intoxication, 33
Irritant gases, antidotes to, 66
JAW, lower: fracture of, 45
KIDNEY DISEASE, blood poisoning from, 34
Kidneys, 28
Knee-cap, fracture of, 48
LACERATED and contused wounds, 49
Lead, salts of, antidotes to, 65
Leeches, 56
Leg, fracture of bones of, 48
Litter, Order of St. John, 52
Liver, functions of, 27
Lungs, 24, 28
MATERIAL and appliances for the relief of the sick and injured, 52
Medical and Surgical Outlines, 29
Mercury salts, antidotes to, 65
Mineral acids, antidotes to, 65
Morphia, antidotes to, 66
 " or opium poisoning, 34
Muscular system, 8
NARCOTICS, antidotes to, 66
Nervous system, 9
Nitrate of silver, antidotes to, 65
OILED SILK, 56
Oils, 64
Opium, antidotes to, 66
 " or morphia poisoning, 34
Order of St. John litter, 52
Organs, internal, diagram of, 23
 " of circulation, 13
 " of digestion, 25
 " of excretion, 28
 " of secretion; 26
 " of special sense, 11 [22
 " of voice and respiration,
Oxalic acid, antidotes to, 65
PADS, 54
Paralysis, indications of, 32
Patella, fracture of, 48
Phosphorus, antidotes to, 65
Plasters, adhesive, 56
Poisoning, blood, from kidney disease, 34
Poisoning, opium or morphia, 34
 " treatment of, 63
Poisons, classification of, 63
 " and antidotes, 65
Poultices, 56
Prussic acid, antidotes to, 66
Pulse, indications of, 31
Pump, stomach, substitute for, 64
Pupils of eyes, indications from, 31
Purifying air, water, soil, &c., materials for, 57
RABID ANIMALS, bites of, 52
Rat poison (phosphorus), antidotes to, 65
Respiration, organs of, 22

Ribs, fracture of, 46
 Roller bandages, 54, 55
 Room, rules for disinfecting an occupied, 58
 Room, rules for disinfecting an unoccupied, 58

SALTS OF LEAD, antidotes to, 65
 Scalds and burns, 51
 Scars, causing deformity, often follow burns, 51
 Secretion, organs of, 26
 Sense, organs of special, 11
 Shivering fits, 31
 Shock or collapse, 34
 Shower bath, 61
 Silk, oiled, 56
 Silver, nitrate of: antidotes to, 65
 Simple fracture, 43
 Skeleton, description of, 4
 " diagram of, 2
 Skin, the, 28
 Skull, fracture of, 45
 Sores, bed, 52
 Special sense, organs of, 11
 Splint and bandage, combination of, 54
 Splints, 54
 " extemporised, 54 [32
 Staggering gait, indications from, 32
 Stertorous breathing, 32
 Stimulants, 56
 Stomach, 26
 Stomach pump, substitute for, 64
 Stretcher, how to place a man on with three bearers, 53

Stretcher only safe means of conveyance in cases of fracture, 45
 " rules for carrying, 53
 Stretchers, 53
 Strychnia, antidotes to, 66
 Sudden death, cases of, 66
 " causes of, 67
 Suffocation by gases, 38
 Sunstroke, 38
 System, the muscular, 8
 " the nervous, 9
TEPID BATHS, 62
 Thigh-bone, fracture of, 47
 Triangular bandage, 54, 55
UNSKILFUL HANDLING, danger of, in cases of fracture, 45
VEINS, 17, 20
 Veins and arteries, difference between, 17
 Venous hæmorrhage, 40
 Vital capacity, 25
 Voice and respiration, organs of, 22
WARM BATHS, 62
 Water, iced, 62
 Wet compress, 62
 Wounds, 49 [49
 " contused and lacerated, [49
 " incised, 49
 " with protrusion of internal organs, 49
 Wounds, materials used in dressing, 55 [47
 Wrist and hand, fractures about,











